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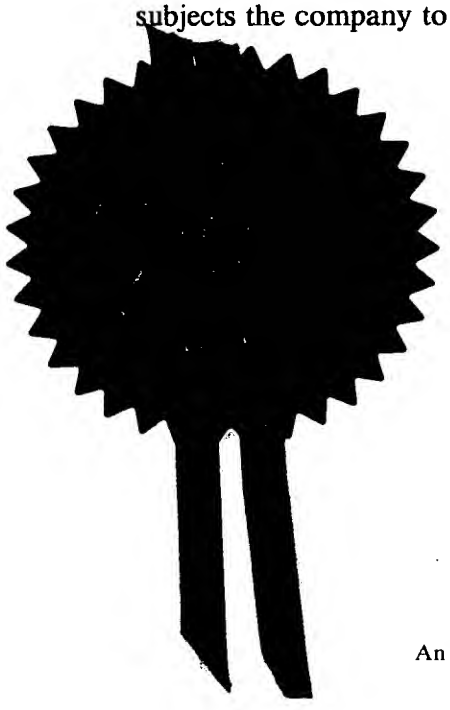

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2. Patent application number
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9904766.4 — 2 MAR 1999

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*
POWERVEST LIMITED
91 CUFFLEY HILL
GOFFS OAK
HERTFORDSHIRE EN7 5HB
UNITED KINGDOM

Patents ADP number *(if you know it)* 7613029001

If the applicant is a corporate body, give the country/state of its incorporation — **UNITED KINGDOM**

4. Title of the invention — **AN EXERCISE GARMENT**

5. Name of your agent *(if you have one)*
BOULT WADE TENNANT
27 FURNIVAL STREET
LONDON
EC4A 1PQ

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Patents ADP number *(if you know it)* **42001**

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Country	Priority application number (if you know it)	Date of filing *(day/month/year)*
UK	**9809672.0**	**7/5/98**

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? — **YES**
(Answer 'Yes' if:
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Priority documents	**0**
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Request for preliminary examination and search *(Patents Form 9/77)*	**1**
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11. I/We request the grant of a patent on the basis of this application.

Signature: Bartt Wade Tennant.

Date: 2 March 1999

12. Name and daytime telephone number of person to contact in the United Kingdom: **Mr. R.G.Jenkins**
0171 404 5921

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AN EXERCISE GARMENT

The present invention relates to exercise garments, and in particular, although not exclusively, to garments intended to be worn during training which are adapted to provide significant additional weight to the wearer. As a result of carrying additional weight, the wearer needs to expend more energy to perform a given physical activity. Such exercise garments are commonly described as resistance training aids or weight training aids and are worn by individuals wanting to increase their overall fitness, endurance, speed, acceleration, and/or strength.

A known technique for carrying additional weight whilst running is to wear a loaded rucksack. As shown in Fig. 1, the rucksack 100 typically comprises a sack portion 104 and shoulder straps 105, and may also include a belt 106 to hold the lower part of the rucksack in contact with the back and inhibit relative movement. The rucksack will typically have been designed to have as low an unladen weight as possible, subject to strength and comfort requirements. For example, the straps will usually include padding material.

In order to provide significant additional weight to the wearer, therefore, suitable material is loaded into the sack portion 104. A disadvantage of this technique, however, is that as a result of substantially all of the weight W_r of a heavily laden rucksack being carried on the back in the sack portion, large and potentially injurious forces may repeatedly be exerted on the middle and lower back, especially as the leading foot strikes the ground.

Furthermore, the centre of gravity of a heavily laden rucksack will, in general, be spaced away from

the back. This can be uncomfortable for the wearer, inhibits any exercise involving rapid rotation of the torso, and can result in potentially damaging torques being applied to the spine. Therefore, although the carrying of a weighted rucksack may be tolerable for training involving mostly straight line running and acceleration, it is not suitable for training involving repeated rapid rotation of the torso and changes in direction, for example football or rugby training.

It is also known to carry additional weight for training purposes in the form of ankle and/or wrist weights 107, as shown in Fig. 1. However, positioning weights at these extremities can result in damaging forces being exerted on the knees and elbows, and the amount of additional weight that can be carried sensibly in this way is severely limited.

A known exercise garment is shown highly schematically in Fig. 2. This garment has the general form of an exercise vest, or training bib, 200 and includes a number of transverse pockets 201 positioned on the chest and midriff region. To provide additional weight to the wearer, a number of substantially rigid bar-shaped weights 202 are inserted into the pockets. Although a large amount of additional weight can be carried in this way, the weighted bib is cumbersome. There is no provision for size adjustment, and unless the bib is selected to be a tight fit (which would itself result in the garment feeling restrictive) there is a tendency for the weights to move relative to the body during exercise, causing discomfort. Positioning of the weights on the chest portion has been found to be particularly uncomfortable, and the front-mounted weights tend to "bounce" on the wearer during running. The semi-rigid

nature of the weights also makes the garment unsuitable for training involving physical contact.

Another known exercise garment is shown highly schematically in Fig. 3. This garment comprises a short sleeved, short legged, close fitting bodysuit 300 made of elastic material such as Lycra and to which weighted panels are attached. The weighted panels are distributed on the chest 301, the midriff 302 and the thighs 303. As the bodysuit is close fitting and elastic, movement of the weighted panels relative to the body is inhibited. However, the bodysuit is highly restrictive, uncomfortable, and hot, and cannot be worn over other exercise clothes, for example team training colours used to identify sides. There is no provision for adjustment and the suit must be selected to be the correct size for the individual. Furthermore, the strength and elasticity of the material used for the bodysuit places restrictions on the maximum weights of the attached panels, and so places a restriction on the amount of additional weight that the suit can provide to the wearer.

It is therefore desirable to provide an exercise garment which addresses problems associated with the prior art.

According to a first aspect of the present invention there is provided an exercise garment comprising:

a yoke portion adapted to be worn over the shoulders, comprising a back portion adapted to extend from the top of the shoulders down the wearer's back, and a front portion adapted to extend from the top of the shoulders down the wearer's front,

the front and back portions each comprising a respective quantity of material selected to provide

weight to the yoke portion;

a weight attached to the yoke portion by at least one strap, the strap or straps being adapted to suspend the weight from the yoke portion at a desired height on the wearer's body; and

a belt adapted to pass around the wearer's body and hold the weight against the body.

Thus, a portion of the additional weight provided by the garment to the wearer is distributed over the shoulders, to the front and back. The inventor has found this to be a particularly comfortable place to carry additional weight during exercise, and it is the best position to carry additional weight from the point of view of safe skeletal loading and minimising risk of injury, particularly to the back. Advantageously, the wearer can carry a large additional weight in the form of the yoke portion without risking injury to the spine.

The weight attached to the yoke portion by at least one strap helps to hold the yoke portion down on the wearer's shoulders to prevent "bouncing" on the shoulders during exercise, and also provides additional weight. The belt helps prevent relative movement between the attached weight and the wearer's body, and prevents the attached weight from "bouncing", horizontally or vertically during exercise.

The yoke portion may comprise a single sealed pocket, extending over the shoulders, and containing both the respective quantities of selected material, inserted to increase the overall weight of the garment, or separate pockets. The pocket(s) may be flexible, and the yoke portion may be pliable or otherwise adapted to conform to the shape of the shoulders.

The term "pocket" is intended to be interpreted as being equivalent also to the terms "parcel" or "pouch" or other terms denoting a sealed volume inside an outer covering.

Advantageously, the height at which the attached weight is suspended from the yoke may be in the wearer's waist region, in which case the majority of the weight of the garment may be shared between the waist region and the shoulders, with negligible weight distributed on the chest and middle back. This weight distribution has been found to be particularly comfortable and helps to reduce the chances of back injury during exercise.

The centre of gravity of the combination of the yoke portion and the attached weight lies inside the torso, and makes the exercise garment particularly suitable for training involving rotation of the torso and rapid changes in direction, for example football and rugby training.

Advantageously the strap or straps may be adjustable, so that the wearer may adjust their length to position the attached weight at a comfortable height on the body.

Advantageously, the weight may be a nominal back weight, attached to the back portion of the yoke and arranged to be suspended against the back. Positioning the weight on the back keeps it out of the way of the wearer's moving arms during exercise and a large additional weight can be provided to the wearer, distributed between the shoulders and back without inhibiting movement.

By linking the weight to the yoke with a strap or straps and holding the weight against the body using a belt, the exercise garment may conveniently be worn over other clothing, and when the straps are

adjustable an optimum fit can be achieved on individuals of various shapes and sizes.

The weight may, advantageously, be attached to both the front portion and back portion by respective straps, so helping to help the yoke portion down and prevent its bouncing on the shoulders during exercise. Upward bouncing of the weight itself is prevented to a certain extent by the belt which may be tightened to hold the weight more firmly against the body.

Advantageously the strap or straps may be adapted to suspend the weight substantially in line with the wearer's spine to ensure that its weight is distributed evenly between the left and right hand sides of the wearer, and may be further arranged to suspend the weight at a height adjacent (i.e. substantially level with) the wearer's lumbar vertebrae. Thus, the majority of the weight of the garment may be distributed away from the middle back, which is a particularly vulnerable injury site.

Advantageously the back weight may be substantially trapezoidal having two substantially parallel sides, and the strap or straps may be adapted to suspend the back weight with the substantially parallel sides extending across the spine, with the shorter side nominally above the longer. The inventor has found this shape to be particularly comfortable when worn next to the lower back, whilst enabling significant additional weight to be provided by the back weight.

Preferably, the exercise garment may comprise a plurality of weights, each of the plurality of weights being attached to the yoke portion by at least one respective strap, the respective straps being adapted to suspend the weights from the yoke portion at a desired height or heights on the wearer's body. Thus,

different weights may be positioned at different heights. In such an arrangement, the belt may be arranged to link the weights and hold each weight against the wearer's body to prevent relative movement during exercise.

The plurality of weights help to keep the yoke portion firmly seated on the shoulders. This arrangement is particularly comfortable as substantially all of the weight of the garment is carried by the shoulders, as each of the plurality of weights is suspended from the yoke by its respective strap or straps. The belt has the primary function of holding the weights against the body, so providing a substantially lateral force rather than a downward force.

One of the plurality of weights may be a back weight as described above, and one or all of the respective straps may be adjustable to alter the nominal height at which the weights are suspended on the body.

The exercise garment may further comprise means for adjustably attaching each weight to the belt to define the relative positions of the weights around the body. Conveniently, this adjustable attachment means may comprise velcro, with, for example, the loop portion being provided on the belt, and the hooked portions being provided on appropriate surfaces of the weights.

The plurality of weights may include a nominal front weight attached to the front portion of the yoke, and this front weight may be arranged to counterbalance a back weight, so providing even weight distribution around the body.

The exercise garment may conveniently include two nominal front weights attached to the left and right

hand sides respectively of the front portion, and these two front weights may be positioned on either side of a buckle fastening the belt at the front centre of the wearer's body. This arrangement has been found by the inventor to be a particularly comfortable way of distributing weight at the front of the wearer's body. The angles at which the front straps supporting the front weights cross the wearer's chest can be adjusted by altering the positions at which the front weights are attached to the belt. Thus, the nominal front weights can be moved further round to the sides of the wearer.

As mentioned above, the arrangements in which all of the plurality of weights are directly supported from the yoke by their respective straps are particularly comfortable and desirable from the point of view of skeletal loading. However, in order to increase the weight provided to the wearer by the exercise garment still further, at least one additional weight may be arranged on the belt and which is not directly attached to the yoke portion by a strap. The additional weight is supported by the belt and is held against the body by the belt. Again, the garment may include means for adjustably attaching the additional weight to the belt to define its relative position around the body. Thus, the straps and weight positions may be adjusted as appropriate by the wearer to provide a desired weight distribution (and hence desired position of the centre of gravity), around the body.

Conveniently each weight (i.e. each of the directly suspended weights and each of the additional weights) may comprise a respective loop through which the belt passes.

Advantageously, the or each weight may be

pliable, so that it may conform to the shape of the wearer's body to increase the comfort of the fit, and also yield under impact, making the garment suitable for contact training purposes.

Advantageously, the or each weight may comprise a sealed parcel containing material selected to provide weight to the garment, i.e. the material may be contained in a one or more sealed pockets. The sealed parcel may comprise a flexible outer skin. Suitable skin materials include strong woven fabric (e.g. woven nylon) and neoprene.

The term "parcel" is intended to be interpreted as including arrangements which may also be described as pockets, bags, pouches, and other means of containing material in a particular volume.

According to a second aspect of the present invention there is provided an exercise garment comprising:

a yoke portion adapted to be worn over the shoulders, comprising a back portion adapted to extend from the top of the shoulders down the wearer's back, and a front portion adapted to extend from the top of the shoulders down the wearer's front,

the front and back portions each including material selected to provide weight to the yoke portion; and

a weighted belt attached to the back portion by at least one strap and to the front portion by at least one strap, the straps being adapted to suspend the weighted belt from the yoke portion at a desired height.

Thus, weight is comfortably and safely distributed over the wearer's shoulders. Additional weight is provided by the weighted belt, which, by means of the straps, helps to hold the yoke down on

the shoulders.

Advantageously, the weighted belt may be attached to the nominal lefthand side of the front portion by a first strap, and to the nominal right-hand side of the front portion by a second strap, and one or more of the straps may be adjustable to alter the height at which the weighted belt is suspended.

The weighted belt may be a belt on which discrete weights are hung, looped, or otherwise attached and/or may comprise, for example, a sealed pocket, parcel, bag or pouch extending at least some of the way around the belt and containing material selected to provide weight to the belt.

The sealed pocket may have a flexible outer skin, made of, for example, a woven material or an elastic material.

Advantageously, the strap or straps may be arranged to suspend the weight or weights or weighted belt substantially at waist height.

In order to contribute to even weight distribution, the nominal right and lefthand sides of the yoke portion may be substantially equal in weight, as may be the back portion and front portion.

The selected material contained in the yoke portion may, advantageously, be distributed substantially uniformly over the yoke portion, so providing uniform weight distribution over the shoulders and also providing some additional weight on top of the shoulders.

Preferably, the front portion of the yoke may comprise a nominal left "arm" adapted to extend from the top of the left shoulder down past the lefthand side of the wearer's neck, and a corresponding right arm. Advantageously, left and right front weights may be hung from the ends of the left and right arms

respectively.

Advantageously the yoke may be adapted to conform substantially to the shape of the wearer's shoulders and may be sufficiently flexible (pliable) to drape over the shoulders. This provides a comfortable fit and by yielding to an applied force, the pliable yoke is compatible with use of the exercise garment for contact training purposes.

The selected material included in the yoke to provide it with weight may be contained in one or more sealed pockets (pouches, parcels, enclosures) which may, conveniently, have flexible outer skins.

The yoke may, advantageously, comprise one large sealed pocket which extends over the shoulders into the right and lefthand sides of both the front and back portions. The selected material may be distributed substantially uniformly throughout this large pocket. The sealed pocket or pockets may be sub-divided or otherwise constricted to inhibit movement of the contained selected material and so inhibit "settling". It is desirable to maintain uniform distribution of the selected material over the tops of the shoulders if possible.

The respective quantities of selected material in the front and back portions may be contained in a single (i.e. the same) pouch, extending over the shoulders.

Alternatively, they may be contained in separate pouches.

The yoke may, advantageously, be arranged to ensure that some of the selected material is located on top of the shoulders.

The material selected to provide weight may be in the form of grains or other particles of a dense substance such as a metal, or may take other suitable

forms, for example a dense liquid, gel or paste. Advantageously, the selected material may be metal shot or pin hole punchings (i.e. the waste material produced when holes are punched to form perforated sheets). Conveniently, the pin-hole punchings may be approximately 2mm diameter punchings from a 2mm thick metal sheet.

The granular (particulate) material may be inserted into flexible pockets in the yoke to increase its weight. As a result of the particulate nature of the inserted material, the sealed pocket(s) or pouch(es) are compliant and may yield safely under applied forces. They provide a comfortable fit and enable the garment to be worn for training which may involve contact.

The inventive exercise garment may be arranged to provide even (i.e. symmetrical) weight distribution over the wearer's torso or may be arranged to provide a non-uniform weight distribution if desired

It will be apparent that the shape and weight distribution over the yoke may be arranged as appropriate, and the lengths of the straps and the positions of the suspended weights may be adjusted in a variety of ways.

Thus, exercise garments embodying the present invention may provide a desired weight distribution over the wearer.

Advantageously, the weight of the yoke portion may comprise between 35 and 65% of the total weight of the garment. It is desirable to carry a significant proportion of the garments total weight in the yoke portion for comfort and safe skeletal loading.

Although garments in which more than 65% of their total weight is contained in the yoke portion may still fall within the scope of the invention in its

broadest sense, the inventor has determined that as the yoke's weight is increased above this proportion, the suspended weight is less effective in holding the yoke down. Thus the garment becomes less comfortable and the yoke has an increasing tendency to bounce on the shoulders.

Advantageously, the total weight suspended on the strap or straps from the yoke portion (i.e. the weight of the suspended weights and/or weighted belt) may comprise between 35 and 65% of the total weight of the garment. It is desirable to carry a significant portion of the garments total weight suspended on the straps in order to hold the yoke portion firmly down on the shoulders.

Advantageously, the yoke portion may comprise approximately 60% of the total weight of the garment, and the total weight suspended by the straps may comprise substantially all of the remaining 40%. This has been determined by the inventor to be a particularly comfortable and advantageous weight distribution.

The straps may comprise a negligible proportion of the total garment weight, e.g. less than 5%.

Preferably, the back portion of the yoke is adapted to extend down the back of the wearer (i.e. along the surface of the back) a distance of no greater than 15cm.

The front portion of the yoke is preferably adapted to extend down the front of the wearer a distance of no greater than 15cm.

Advantageously, the exercise garment may be adapted to distribute at least 95% of its total weight between a region within 10cm of the nominal height of the top of the wearer's shoulders and a region below the thoracic vertebrae.

All of the weight suspended by the straps may be positioned lower than the wearer's thoracic vertebrae.

By distributing the majority of the garments weight between the regions close to the top of the shoulders and approximately at waist level, significant loading is kept away from the middle back (which is a vulnerable injury site) and off the chest region, which makes the garment more comfortable to wear, prevents uncomfortable "bouncing" of weights on the chest, and does not significantly inhibit chest expansion and hence breathing.

Advantageously, the belt may be adjustable at both its ends so that its length may be altered whilst retaining the same fastening position relative to the body.

The yoke portion may comprise a pair of weighted straps (i.e. straps containing material deliberately selected and inserted to provide weight to the yoke) adapted to drape over the wearer's left and right shoulders respectively.

According to a third aspect of the present invention there is provided an exercise garment comprising a shoulder weight adapted to drape over the left and right shoulders;

at least one additional weight attached to the shoulder weight by at least one respective strap; and

a belt adapted to hold the or each additional weight against the body.

The garment may be adapted to provide a desired weight distribution over the wearer's body.

Advantageously, the exercise garment may be further adapted to permit adjustment of the position of the or each additional weight with respect to the wearer's body.

The yoke and weights (including the additional

weights) and weighted belt may all have similar construction.

Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figs. 1, 2 and 3 show resistance training aids in accordance with the prior art;

Fig. 4 is a schematic plan view of an exercise garment embodying the present invention;

Fig. 5 is a schematic front view of the embodiment of Fig. 4 as it would be arranged on a wearer;

Fig. 6 is a front perspective view from above and one side of another embodiment of the present invention;

Fig. 7 is a rear perspective view from below and the other side of the embodiment of Fig. 6;

Fig. 8 is a schematic plan view of the yoke portion of the embodiment shown in Fig. 6 and 7;

Fig. 9 is a schematic cross section of the yoke portion shown in Fig. 8, along line AB;

Fig. 10 is a schematic side view of the embodiment of Figs. 6,7,8 and 9 as worn;

Fig. 11 is a schematic side view of another embodiment of the present invention;

Fig. 12 is a schematic perspective view of a further embodiment;

Fig. 13 is a schematic perspective view of a further embodiment of the present invention;

Fig. 14 is a schematic perspective view of a further embodiment;

Fig. 15 is a schematic perspective view of a further embodiment;

Fig. 16 is a schematic plan view of part of the embodiment shown in Fig. 15;

Fig. 17 is a schematic diagram of part of the embodiment shown in Fig. 17; and

Fig. 18 is a schematic diagram of part of the embodiment shown in fig. 15.

Referring now to Figs 4 and 5, in a first embodiment of the present invention the exercise garment includes a yoke portion 2 having a back portion 21 which is arranged to extend from the top of the shoulders down the back of the wearer, and extending across the back of the neck. A front portion of the yoke comprises a left arm 22L and a right arm 22R extending from the top of the shoulders down the front of the wearer. In this embodiment the yoke is deformable and substantially symmetrical when laid on a flat surface, as shown in the plan view of Fig. 5. The yoke portion is made of dense flexible material of substantially uniform thickness and has a mass of ten kilograms. Thus, the yoke portion provides a significant additional weight to the wearer, drapes over both shoulders and passes round the back of the wearer's neck. The yoke portion can also be termed a shoulder weight.

A back weight 3B is attached to the back portion 21 of the yoke 2 by two straps 5. When the garment is worn, these straps suspend the back weight 3B in line with the spine at a height corresponding to the small of the wearer's back. The back weight 3B is substantially trapezoidal, with the straps 5 being attached to the shorter of the two parallel sides. Thus, when the garment is worn the wider part of the back weight is positioned lower on the wearer's back, and this arrangement has been found by the inventor to be a particularly comfortable way of carrying substantial additional weight on the back.

The extent of the back portion down the wearer's

back, and the length of the straps supporting the back weight are arranged such that no significant weight is distributed on the wearer's midback, so helping to prevent back injuries.

The yoke portion 2 is arranged such that the front and back portions have substantially equal weight and hence the yoke portion itself is balanced evenly on top of the shoulders.

Left and right front weights 3L, 3R are attached to the front and right arms of the front portion of the yoke by respective straps 5. The combined weight of the front weights is equal to the weight of the back weight.

Thus, the front and back weights balance when the garment is worn, and exert a combined additional downward force on the shoulders by means of the supporting straps 5. The garment also includes a belt 6 linking the front and back weights and holding them in contact with the wearer's body.

The belt is provided with means for adjustably attaching the front weights, and their positions on the belt can be varied, as shown by the arrows A. By adjusting their positions in this way, the angles θ_r and θ_l which the front straps make with the vertical when viewed from the front of the wearer can be altered to achieve the most comfortable, or otherwise desirable, weight distribution.

The belt 6 holds the weights against the wearer's body by means of loops 31 attached to the weights, through which the belt passes.

The lengths of the straps supporting the front weights are arranged such that the front weights are suspended at waist height on the wearer. The lengths of the left and right arms 22L, 22R of the front portion and the lengths of the front straps are

arranged such that negligible weight is distributed on the wearer's chest.

The garment may be worn over other clothing and provides significant weight to the wearer without restricting arm movement. All of the additional weight provided by the garment is held close to the wearer's body, and hence the garment is compatible with training involving rapid rotation of the torso and changes in direction. In this embodiment, the centre of gravity of the combination of back weight 3B, yoke 2, and front weights 3R, 3L is close to the centre of the chest.

In addition to the front and back weights directly to and suspended from the yoke, additional weights 4 may be added on the belt 6 to further load the wearer. These additional weights are not directly supported by straps, but are adjustably attached to the belt. The additional weights may be distributed symmetrically or non symmetrically around the belt as desired, with their positions variable as shown by the arrows A. In general, it is desirable to position the additional weights 4 as close as possible to the strap-supported nominal front and back weights.

Fig. 6 shows an embodiment similar to that shown in Figs. 4 and 5. According to this embodiment, the exercise garment 1 includes a flexible yoke portion 2, filled (padded) with high density material to increase its weight.

The yoke portion 2 is shown schematically in plan view in Fig. 8 and a schematic cross section along line AB of Fig. 8 is shown in Fig. 9. The yoke portion has a first flexible outer skin F2 of neoprene and a second flexible outer skin F1 of woven nylon. In alternative embodiments both skins may be formed from woven nylon, or other materials or combinations of

materials may be used. In this particular embodiment the woven nylon skin F1 is intended to be worn adjacent to the body. An edging strip e is stitched s around the edges of the flexible outer skins to form a sealed pocket P between them. The sealed pocket is sub-divided by lines of stitching S1, S2 along the back portion 21, and is constricted by short lines of stitching SC spaced along the left and right arms of the front portion 22.

The sealed pocket P contains the padding material 23 which comprises particles g of a dense material. It will be apparent that a wide variety of materials may be suitable for selection as the "filling" for the yoke. For example, sand may be used, or, in order to provide even greater weight to the yoke portion metal shot or pin hole punchings may be used. By using dense material having a granular or particulate nature, the yoke is able to deform (yield) under an applied force and so is suitable for contact training without risking injury to the wearer or other party involved. This construction enables large weights to be carried in the yoke portion whilst retaining its flexible nature and so enabling it to conform to the shape of the wearer's shoulders for comfortable exercise.

In the embodiment of Fig. 6, the front and back weights 3L, 3R and 3B and the additional weights 4 have a similar construction to the yoke portion 2.

The subdivision and constriction of the sealed pocket in the yoke portion prevents the dense padding material 23 from "settling" and so maintains substantially uniform distribution of yoke weight over the shoulders.

In this embodiment, the back weight 3B is again supported from the back portion 21 of the yoke by two straps 5, which are adjustable in length by means of

buckles 99. The back straps 5 are attached to the yoke and back weight by means of high density nylon loops 98. The back weight 3B includes two belt loops 31 attached to its nominally inward facing surface F1. The nominally inward facing surface of the belt 6 comprises a component of Velcro and the belt loops 31 are provided with the corresponding Velcro component to engage that on the belt. This fastening locates the back weight 3B firmly on the belt, although the position of the back weight is already substantially determined by the two adjustable back straps from the yoke. The front and additional weights 3R, 3L and 4 are adjustably attached to the belt in the same manner as the back weight, but their positions can be adjusted over a significant range.

The left and right front weights 3L, 3R are attached to the left and right arms respectively of the front portion of the yoke by adjustable straps 5. The front weights extend up from the belt towards the yoke portion, whilst the additional weights 4 extend substantially along the belt. The additional weights 4 are positioned next to the front weights 3L, 3R, toward the sides of the wearer.

The ends 61 of the belt 6 each loop back on themselves around corresponding portions of a front buckle 62. This provides adjustment at both of the belt so that its length can be altered whilst retaining the same buckle position with respect to the wearer.

Moving on to Fig. 7, this alternative view of the embodiment of Fig. 6 shows the belt loops 31 provided on the front and additional weights, and also shows loops 63 provided to hold the looped back ends 61 of the belt 6. The looped back ends are further held in place by Velcro.

Thus, the embodiment of Figs. 6 and 7 is fully adjustable to fit the wearer and position the weights to give a desired weight distribution and centre of gravity. In this particular embodiment the yoke portion has a mass of 7kg, the back weight 3B has a mass of 3kg, each front weight has a mass of 1.5kg, and each additional weight has a mass of 0.5kg. The total mass of the garment is less than 15kg.

Being fully adjustable and employing a pliable yoke and weights, the garment can be worn comfortably during exercise without chaffing or rubbing, or causing blisters and sores.

Referring again in Fig, 8, ideally the distances that the front and back portions extend from the nominal shoulder top position (X_f and X_b respectively) should be as short as possible to keep the yoke portion's weight distributed close to the top of the shoulders.

In reality, the dimensions of the yoke will be a compromise, in order that it provides a desired weight to the wearer, is not uncomfortably thick and inflexible, and does not extend too far down the front and back. A good practical compromise is that XF and XB should be no greater than 15cm.

Moving on to Fig. 10, this shows schematically the embodiment of Figs. 6 and 7 being worn during training. Over 45% of the total weight of the garment is contained in the yoke portion, located within a height of 10cm from the top of the shoulders. More than 45% of the total weight of the garment is distributed on the wearer's waist region, below the thoracic vertebrae. The centre of gravity C of the exercise garment when worn is located in the centre of the chest.

Fig. 11 shows a further embodiment in which a

back weight 3B is attached by straps 5F and 5B to the front and back portions 22 and 21 respectively of a yoke. Thus, the single back weight 3B exerts a downward force on both the front and back portions and so helps to keep the yoke portion seated firmly on the wearer's shoulders. A belt 6 passes around the wearer's body and holds the back weight 3B tightly against the wearer's back to prevent relative movement.

Fig. 12 shows an alternative embodiment in which the yoke portion 2 is semirigid and includes an aperture H through which the wearer passes his or her head. A plurality of weights 3 are suspended from the yoke portion 2 at waist height by straps 5. The weights are linked by a belt 6 which may be tightened to hold the weights against the wearer's body.

Fig. 13 shows an alternative embodiment comprising a flexible yoke portion adapted to drape over the wearer's shoulders. In this embodiment, the back portion 21 has a greater mass than the front portion 22 and extends further down the wearer's back than does the front portion down the wearer's front. No weight is suspended from the back portion, but a front weight 3F is suspended from the front portion 22 by means of a wide tape 5. A belt 6 holds the wide weight 3F against the wearer's midriff and an additional weight is carried on the belt 6 to adjust the weight distribution on the body.

Fig. 14 shows an alternative embodiment where the yoke portion 2 is in the form of two weighted straps 201 each weighted strap being adapted to drape over a respective one of the wearer's shoulders. A weighted belt 600 is suspended from the yoke portion substantially at waist height by means of straps 5. In this embodiment, the weight suspended from the straps 5 is distributed uniformly around the weighted belt

600.

The embodiment shown in Fig. 15 also comprises a weighted belt 600 suspended by straps 5 from a yoke portion 2. Rather than weight being distributed uniformly around the belt, in this embodiment the weighted belt 600 comprises two side belt portions 604 each including a respective sealed pocket filled with dense material to provide weight. Clearly, the total weight of the side belt may be chosen as appropriate for the particular training application, and to date side belts having a mass of 1kg or 2.5kg have been used, giving a total weighted belt portion mass slightly in excess of 2kg or 5kg respectively.

The length of the weighted belt 600 is adjustable. A garment has been manufactured in nominal medium size and gives waist adjustment between 30-36 inches (760-920 mm) this adjustment is achieved by means of a front buckle and rear horizontal adjustment means.

The height at which the weighted belt 600 is supported on the body is adjustable by means of front and rear vertical adjustments on the supporting straps 5.

The yoke portion comprises two weighted straps 201 adapted to drape over the left and right shoulders. Each weighted strap includes a sealed pocket containing dense material, and embodiments have, to date, employed weighted straps each having a mass of 2kg or 4kg, giving a total yoke portion mass slightly in excess of 4kg or 8kg. Straps of other masses may of course be used. In the "medium" size embodiment, the total length of the combination of the weighted shoulder strap and its corresponding straps (used to suspend the weighted belt) is adjustable

between 32-50 inches (800-1200 mm).

Fig. 16 shows a schematic plan view of the yoke of the embodiment shown in Fig. 15. The length of the straps 5 attached to the yoke portion are adjustable by means of sliding buckles 99 for simple adjustment. The weighted shoulder straps 201 are connected by a connecting portion 211 which is intended to cross round the back of the wearer's neck. The connecting portion 211 prevents the weighted straps from slipping sideways off the shoulders. The nominal shoulder position is shown on Fig. 16, and the combined weight of the right and left front arms 22R, 22L is approximately equal to that of the back portion 21.

Referring now to Fig. 17, which shows a rear portion of the weighted belt in greater detail, the rear support straps 5 are 25mm wide and 3mm thick, and are attached to the weighted belt by heavy duty stitching. The weighted belt 600 includes a stiffener insert 605 in the middle of the back, which may be made of plastic. The side belts 604 may be based on 2kg and 5kg wrist weights. Sliding buckles 63 provide rear adjustment and are of the non-slip variety, so that when positioned and worn, the adjustment does not move during operation. When fully extended the adjustment should give 80 to 90mm extra length of belt.

Fig. 18 shows a schematic front view of part of the weighted belt. The vertical straps 5 again are 25mm wide and 3mm thick and may comprise any suitable material, for example nylon or canvas. The points at which the straps meet the weighted belt may be reinforced and the front fastening of the weighted belt is achieved by means of a Velcro backed strap and a tough plastic clip-in buckle.

The embodiment of Figs. 15-18 is a resistance training aid intended to add weight to an individual who is trying to enhance his or her endurance, speed and acceleration. The garment is worn over the shoulders via adjustable straps and fastened at the straps around the waist on a weighted belt.

The garment includes weighted shoulder straps which form part of a yoke which sits high on the shoulders crossing at the back of the neck and the rear adjustable straps run down to attach to the belt, at the middle of the lower back.

The shoulder straps fall down the front to counterbalance the back weights and yoke, to the belt at the front.

The front straps are also adjustable along with the "kidney" positioned belt adjusters as well as the final belt buckle adjustment. This is to ensure an accurate fit to the body during training, so chaffing and movement of the garment is kept to an absolute minimum.

The materials used in the garments construction are predominantly nylon and neoprene with nylon straps for lightness and strength.

The internal weight of the system is raw sand or other suitable material which is held together with heavy cotton or nylon fibre stitching. The sand (or other material) infill weight is sealed in non-flammable bags to avoid leakage. The garment may be manufactured in small, medium, large and extra large sizes to enable a wider cross section of sports people to use it.

Embodiments of the present invention may be manufactured in a variety of total weights. For example a small system may have a mass of 3kg, whilst an extra large system may have a mass of 12kg.

By positioning a portion of the total mass of the garment over (on top of) the shoulders, the present invention enables a very large additional weight to be added and carried comfortably by the wearer.

Each feature described in this specification (which term includes the claims) may be incorporated in the present invention independently of other described features.

CLAIMS:

1. An exercise garment comprising:

a yoke portion adapted to be worn over the shoulders, comprising a back portion adapted to extend from the top of the shoulders down the wearer's back, and a front portion adapted to extend from the top of the shoulders down the wearer's front,

the front and back portions each comprising a respective quantity of material selected to provide weight to the yoke portion;

a weight attached to the yoke portion by at least one strap, the strap or straps being adapted to suspend the weight from the yoke portion at a desired height on the wearer's body; and

a belt adapted to pass around the wearer's body and hold the weight against the body.

2. An exercise garment in accordance with claim 1 wherein the strap or straps are adjustable.

3. An exercise garment in accordance with claim 1 or claim 2 wherein the weight is a nominal back weight attached to the back portion of the yoke.

4. An exercise garment in accordance with claim 3, the strap or straps being adapted to suspend the back weight substantially in line with the wearer's spine.

5. An exercise garment in accordance with claim 3 or claim 4 wherein the strap or straps are adapted to suspend the back weight at a height substantially level with the wearer's lumbar vertebrae.

6. An exercise garment in accordance with claim 4 or

5, wherein the back weight is substantially trapezoidal in one aspect, having two substantially parallel sides, the strap or straps being adapted to suspend the back weight with the substantially parallel sides extending across the spine, the shorter of said sides being higher up the back than the longer.

7. An exercise garment in accordance with any preceding claim, comprising a plurality of weights, each weight being attached to the yoke portion by at least one respective strap, the respective straps being adapted to suspend the weights from the yoke portion at a desired height or heights on the wearer's body, the belt being arranged to link the weights and being adapted to hold each weight against the wearer's body.

8. An exercise garment in accordance with claim 7 wherein the respective straps are adjustable.

9. An exercise garment in accordance with claim 7 or claim 8, further comprising means for adjustably attaching each weight to the belt to define the relative positions of the weights around the body.

10. An exercise garment in accordance with any one of claims 7 to 9, wherein the plurality of weights comprises a nominal back weight attached to the back portion of the yoke and a nominal front weight attached to the front portion of the yoke.

11. An exercise garment in accordance with claim 10, wherein the nominal front weight is attached to the nominal left hand side of the front portion, the

plurality of weights further comprising a second nominal front weight attached to the nominal right hand side of the front portion.

12. An exercise garment in accordance with any preceding claim, further comprising at least one additional weight arranged on the belt and not directly attached to the yoke portion by a strap, the belt being adapted to hold the or each additional weight against the body.

13. An exercise garment in accordance with claim 12, further comprising means for adjustably attaching the or each additional weight to the belt to define the relative position of the or each additional weight around the body.

14. An exercise garment in accordance with claim 13 wherein the adjustable attachment means comprises Velcro.

15. An exercise garment in accordance with any preceding claim, wherein the or each weight comprises a respective loop, the belt passing through the loop.

16. An exercise garment in accordance with any preceding claim, wherein the or each weight is pliable.

17. An exercise garment in accordance with any preceding claim, wherein the or each weight comprises a sealed parcel containing material selected to provide weight to the garment.

18. An exercise garment in accordance with claim 17

wherein the sealed parcel comprises a flexible outer skin.

19. An exercise garment comprising:

a yoke portion adapted to be worn over the shoulders, comprising a back portion adapted to extend from the top of the shoulders down the wearer's back, and a front portion adapted to extend from the top of the shoulders down the wearer's front,

the front and back portions each comprising a respective quantity of material selected to provide weight to the yoke portion; and

a weighted belt attached to the back portion by at least one strap and to the front portion by at least one strap, the straps being adapted to suspend the weighted belt from the yoke portion at a desired height.

20. An exercise garment in accordance with claim 19, wherein the belt is attached to the nominal left hand side of the front portion by a first strap, and to the nominal right hand side of the front portion by a second strap.

21. An exercise garment in accordance with claim 19 or 20 wherein the straps are adjustable.

22. An exercise garment in accordance with any one of claims 19 to 21, wherein the belt comprises a sealed pocket containing material selected to provide weight to the belt.

23. An exercise garment in accordance with claim 22 wherein the sealed pocket comprises a flexible outer skin.

24. An exercise garment in accordance with any preceding claim, wherein the desired height is generally waist height.

25. An exercise garment in accordance with any preceding claim, wherein the nominal right hand side and the nominal left hand side of the yoke portion are substantially equal in weight.

26. An exercise garment in accordance with any preceding claim, wherein the back portion and front portion of the yoke are substantially equal in weight.

27. An exercise garment in accordance with any preceding claim, wherein the selected material in the yoke portion is distributed substantially uniformly over the yoke portion.

28. An exercise garment in accordance with any preceding claim wherein the front portion comprises a nominal left arm adapted to extend from the top of the left shoulder down past the left hand side of the wearer's neck, and a nominal right arm adapted to extend from the top of the right shoulder down past the right hand side of the neck.

29. An exercise garment in accordance with claim 28 as depending from claim 11 wherein the nominal front weights are attached to respective ends of the left and right arms.

30. An exercise garment in accordance with any preceding claim, wherein the yoke is adapted to conform substantially to the shape of the wearer's shoulders.

31. An exercise garment in accordance with any preceding claim, wherein the yoke is pliable.

32. An exercise garment in accordance with any preceding claim, wherein the yoke comprises at least one sealed pocket, the respective quantities of selected material being contained in the pocket or pockets.

33. An exercise garment in accordance with claim 32, wherein the or each sealed pocket comprises a flexible outer skin.

34. An exercise garment in accordance with claim 32 or 33, wherein the respective quantities of selected material are contained in the same sealed pocket, said same sealed pocket being arranged to extend over the top of the shoulders.

35. An exercise garment in accordance with claim 34, wherein said same sealed pocket includes at least one constriction to inhibit movement of the contained selected material.

36.An exercise garment in accordance with claim 32 or 33, wherein the respective quantities of selected material are contained in separate sealed pockets.

37. An exercise garment in accordance with any preceding claim, wherein the material selected to provide weight is granular or particulate.

38. An exercise garment in accordance with any preceding claim, wherein the material selected to provide weight is metallic.

39. An exercise garment in accordance with any preceding claim providing a desired weight distribution over the wearer.

40. An exercise garment in accordance with any preceding claim wherein the yoke portion comprises 35 to 65% of the total weight of the garment.

41. An exercise garment in accordance with any preceding claim wherein the total weight suspended by the straps from the yoke portion comprises 35 to 65% of the total weight of the garment.

42. An exercise garment in accordance with any preceding claim wherein the yoke portion comprises approximately 60%, and the total weight suspended by the straps from the yoke portion comprises approximately 40% of the total weight of the garment.

43. An exercise garment in accordance with any preceding claim wherein the back portion of the yoke is adapted to extend down the back a distance no greater than 15cm.

44. An exercise garment in accordance with any preceding claim wherein the front portion of the yoke is adapted to extend down the front a distance no greater than 15cm.

45. An exercise garment in accordance with any preceding claim, adapted to distribute at least 95% of its total weight between a region within 10cm of the nominal height of the top of the wearer's shoulders and a region below the thoracic vertebrae.

46. An exercise garment in accordance with any preceding claim, adapted such that all of the weight suspended by the straps is positioned nominally lower than the wearer's thoracic vertebrae.

47. An exercise garment in accordance with any preceding claim wherein both ends of the belt are adjustable to alter the belt's length.

48. An exercise garment in accordance with any preceding claim wherein the yoke portion comprises a first weighted strap adapted to drape over the wearer's left shoulder and a second weighted strap adapted to drape over the wearer's right shoulder.

49. An exercise garment in accordance with any preceding claim, wherein the yoke portion has a mass in the range 3-12Kg.

50. An exercise garment comprising a shoulder weight adapted to drape over the left and right shoulders;

at least one additional weight attached to the shoulder weight by at least one respective strap; and

a belt adapted to hold the or each additional weight against the body.

51. An exercise garment in accordance with claim 50 being further adapted to permit adjustment of the position of the or each additional weight with respect to the wearer's body.

52. An exercise garment in accordance with any preceding claim, having a total mass in the range 4-20Kg.

53. An exercise garment substantially as hereinbefore described with reference to the accompanying drawings.

PRIOR ART

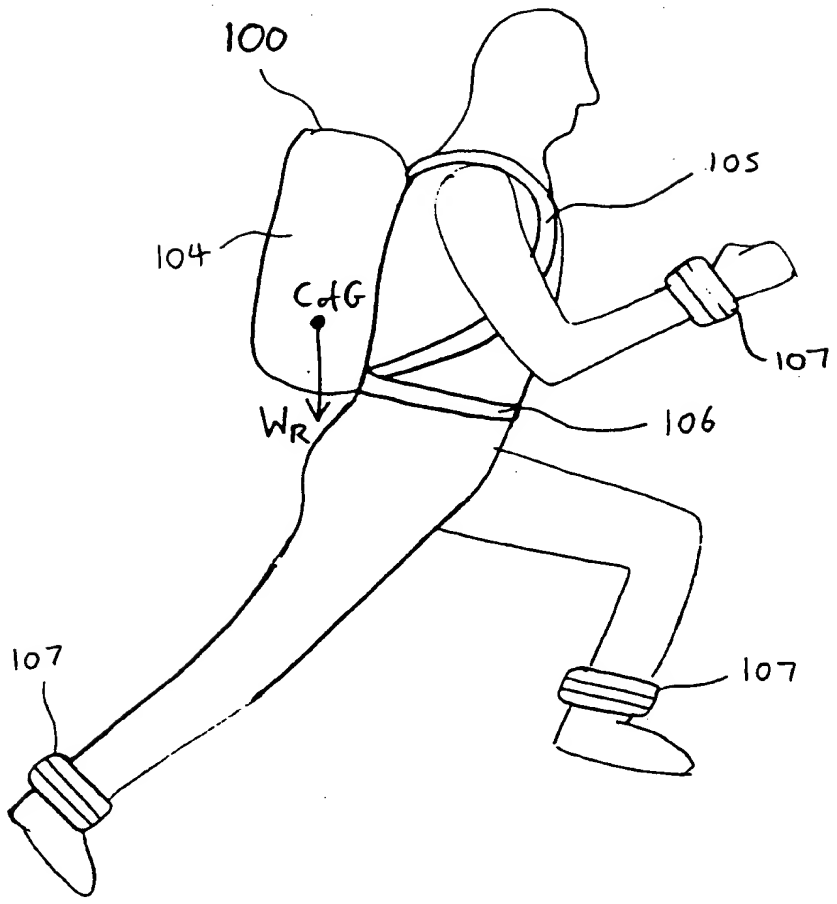


Fig.1

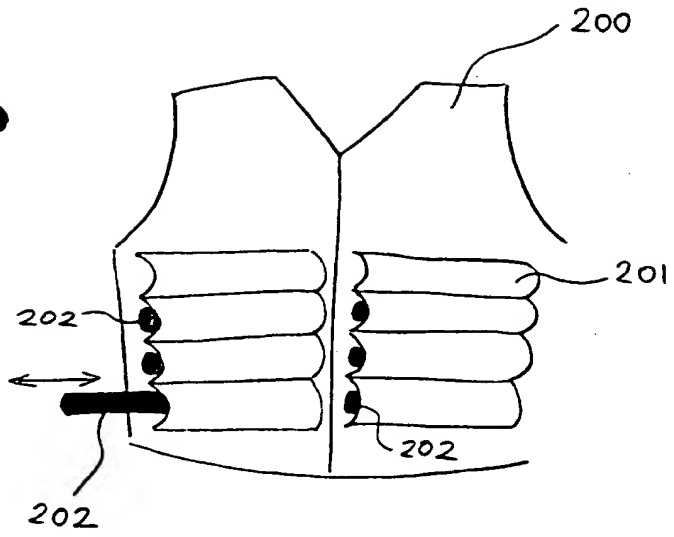


Fig. 2

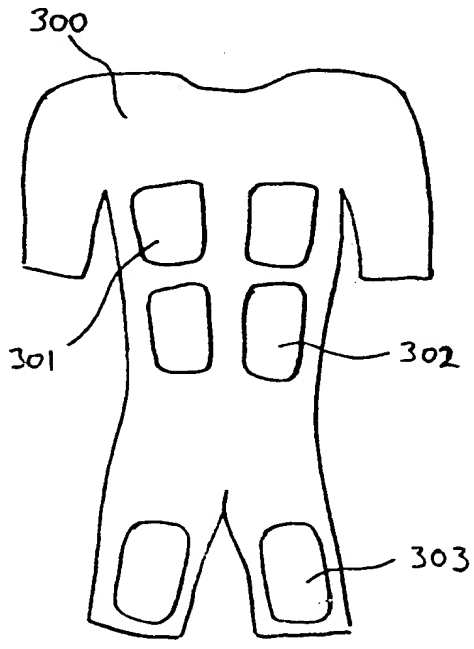


Fig. 3

Fig. 4

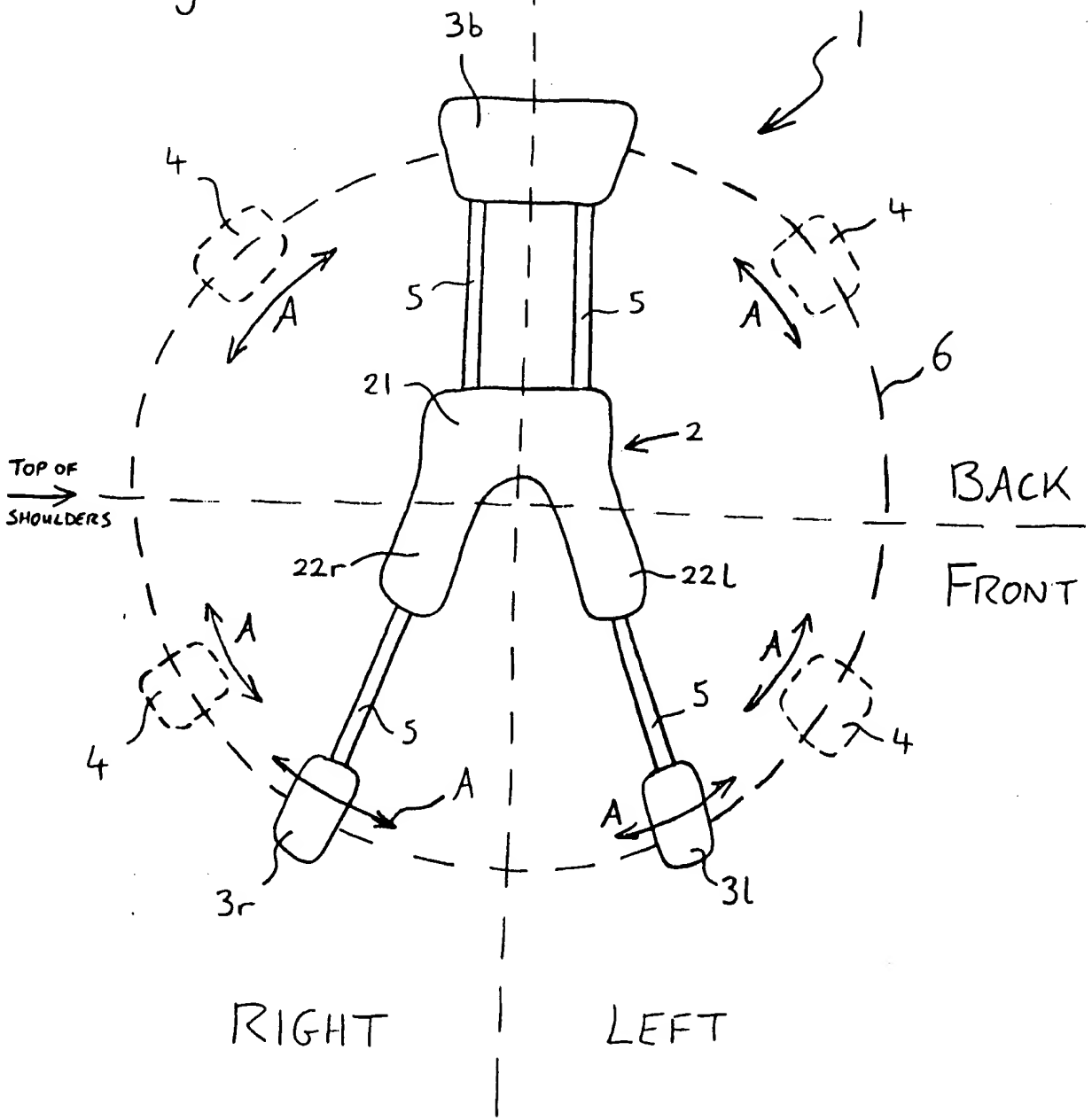

3b
1
4
4
5
5
A
A
21
2
6
TOP OF SHOULDERS
BACK
FRONT
22r
22l
A
A
5
5
4
4
A
A
3r
3l
RIGHT
LEFT

Fig. 5

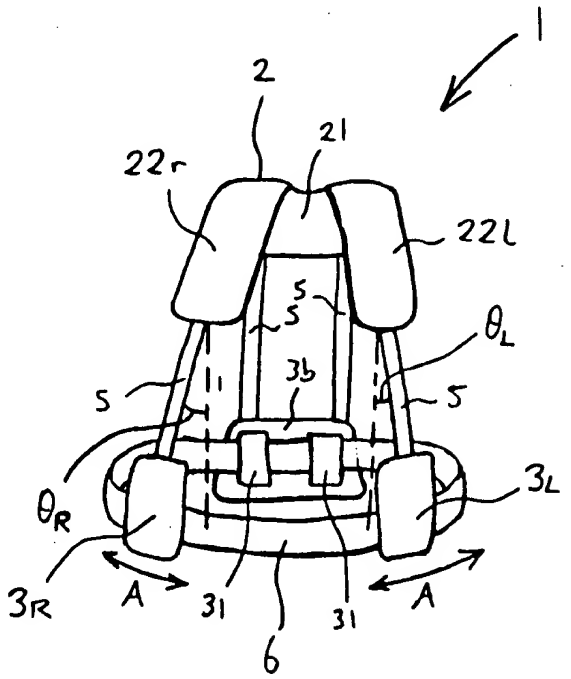
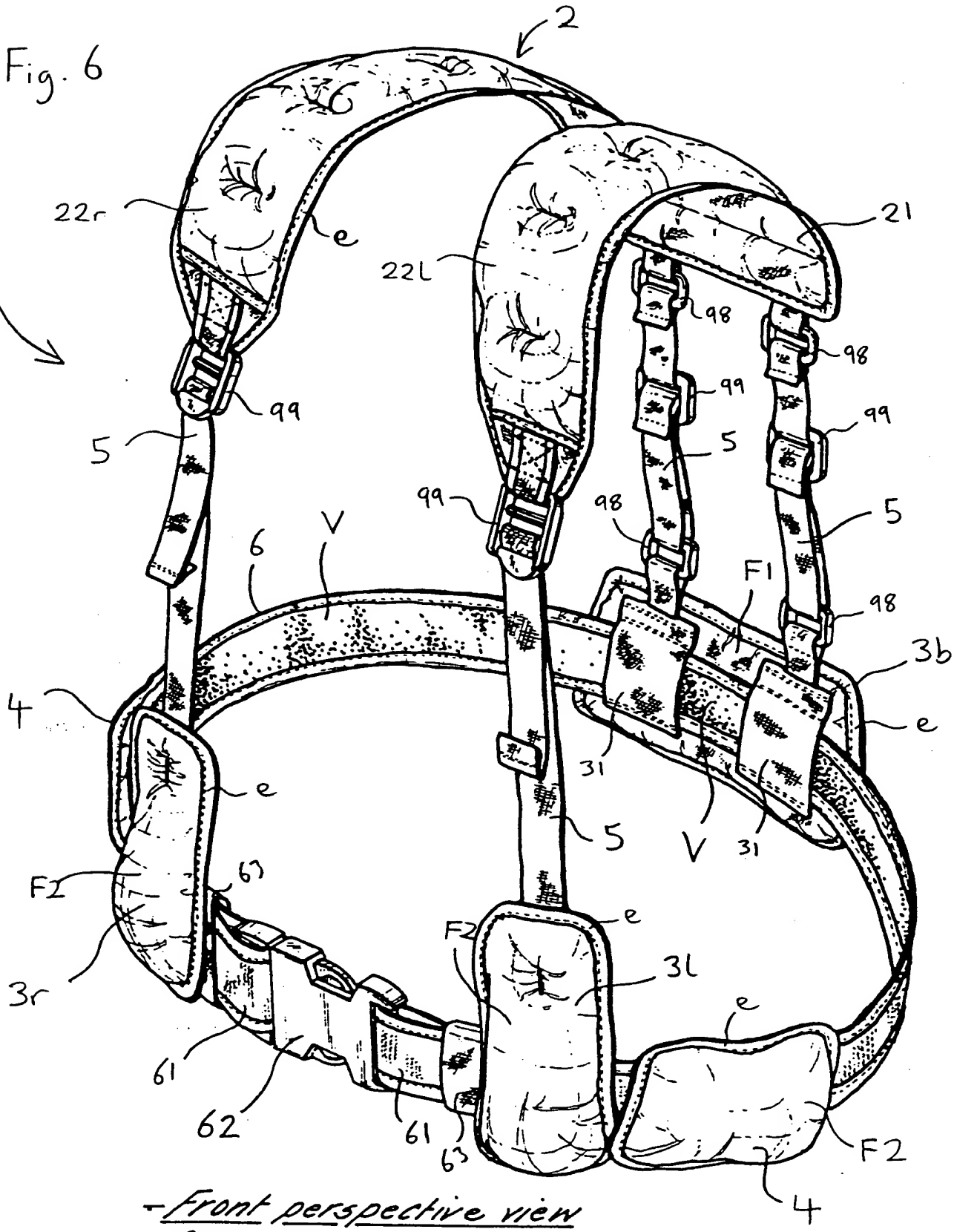
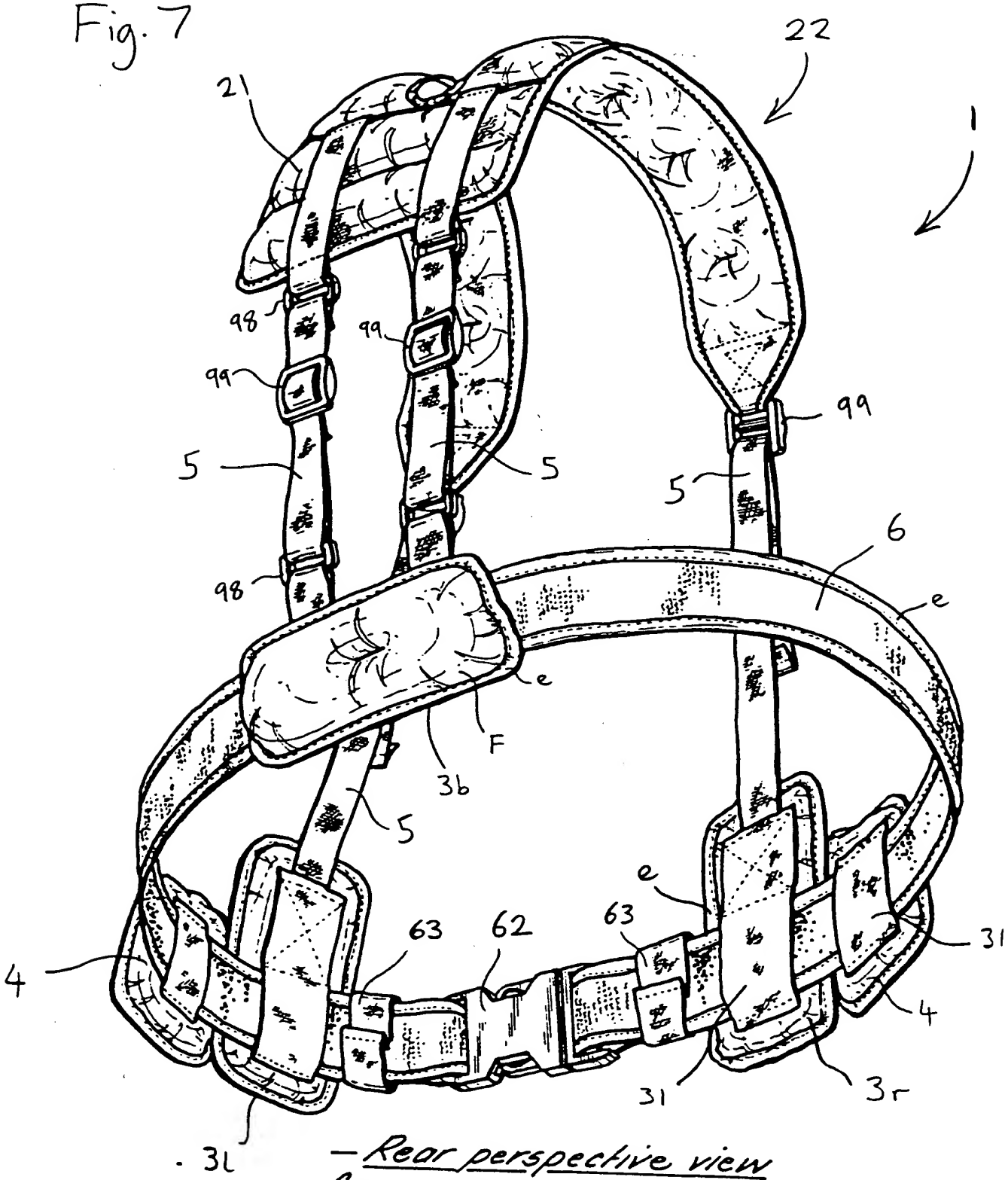

1
2
21
22r
22l
5
5
θL
3b
5
5
θR
3L
3R
A
31
31
A
6

Fig. 6



- Front perspective view from above and one side. -

Fig. 7



— Rear perspective view from below and other side —

Fig. 8

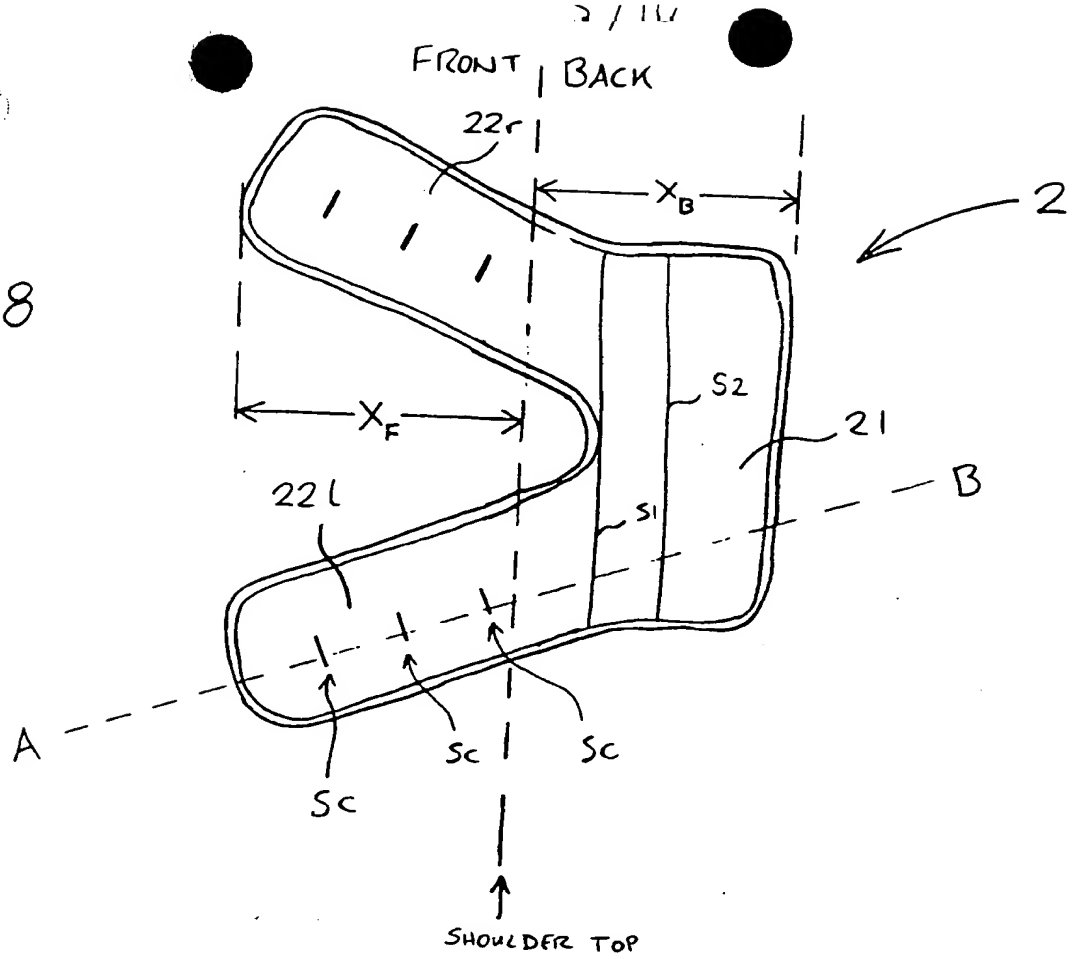
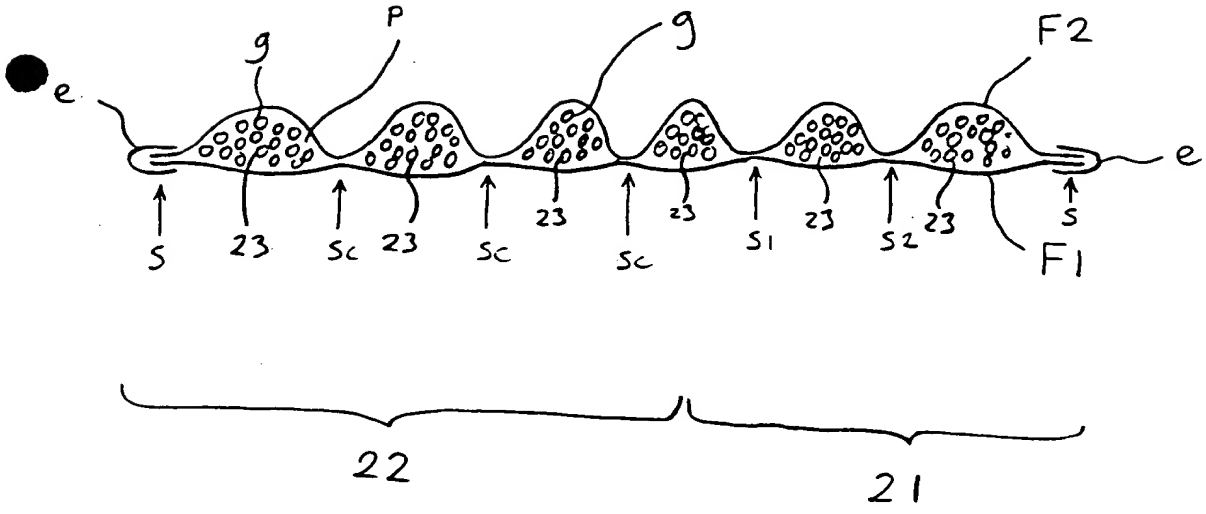

FRONT
BACK
22r
X_B
2
X_F
S2
21
22l
S1
B
A
Sc
Sc
Sc
SHOULDER TOP

Fig. 9


e
g
P
g
F2
e
S
23
Sc
23
Sc
23
Sc
23
S1
23
S2
23
S
F1
22
21

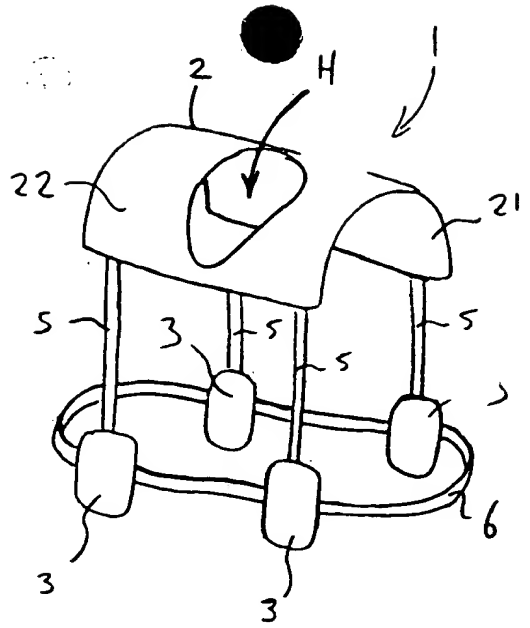


Fig. 12

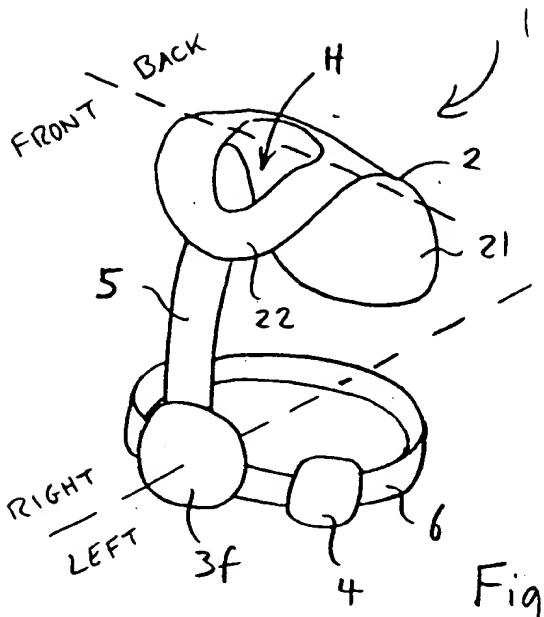


Fig. 13

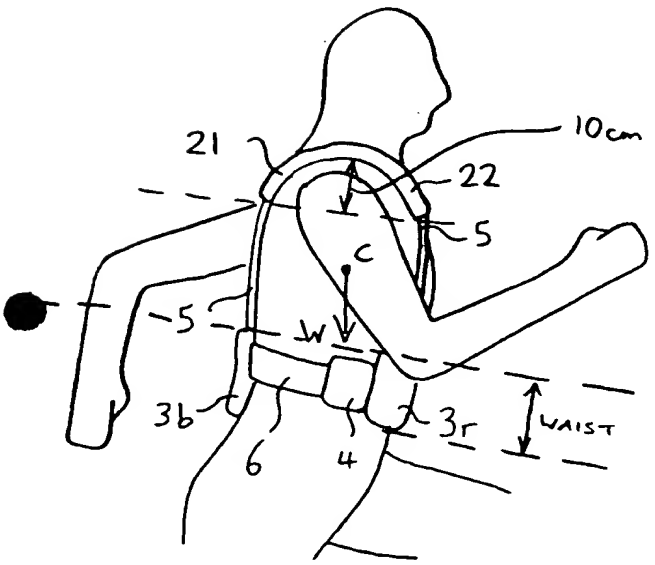


Fig. 10

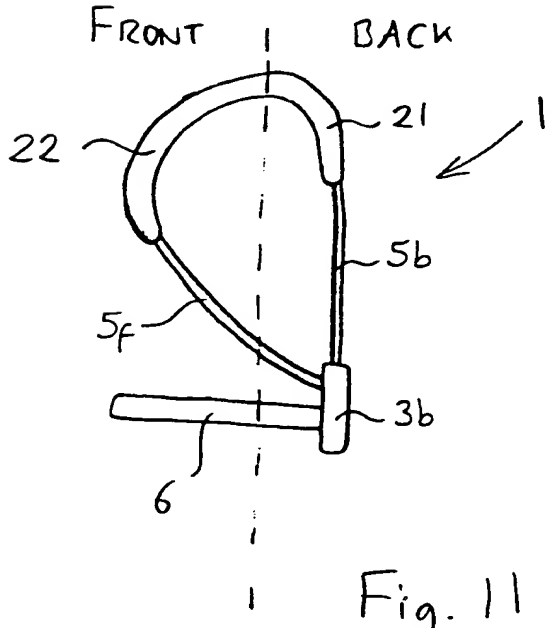


Fig. 11

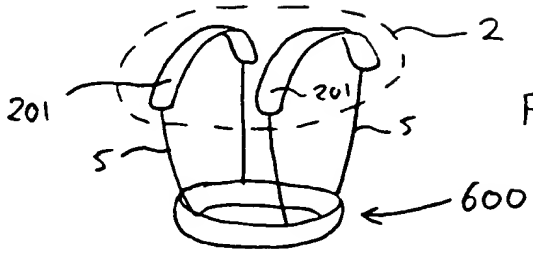


Fig. 14

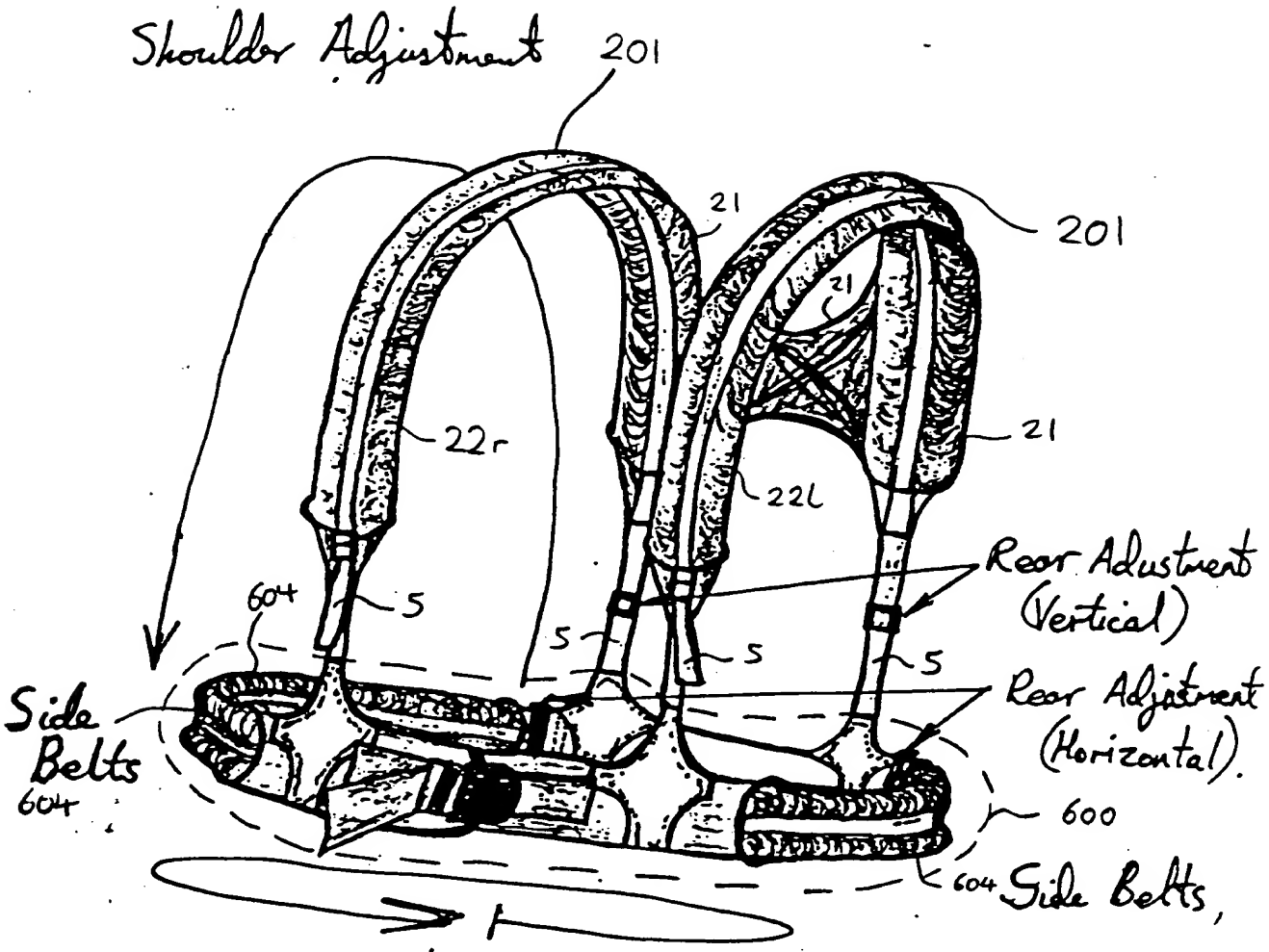

Shoulder Adjustment
201
21
201
21
21
22r
22L
Rear Adjustment (Vertical)
604
5
5
5
5
Rear Adjustment (Horizontal)
Side Belts
604
600
604 Side Belts,
Waist Adjustment

Fig 15

Fig 16

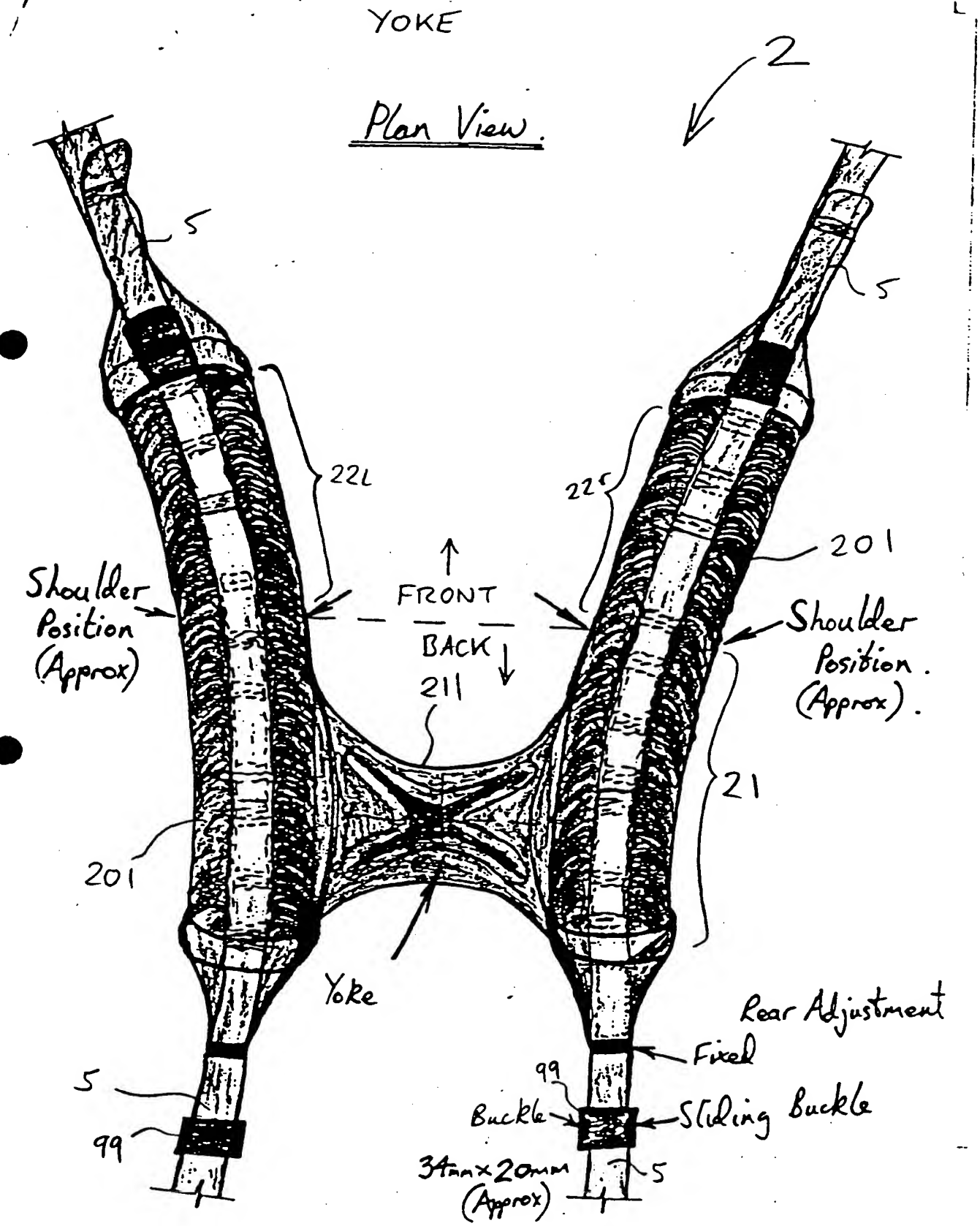
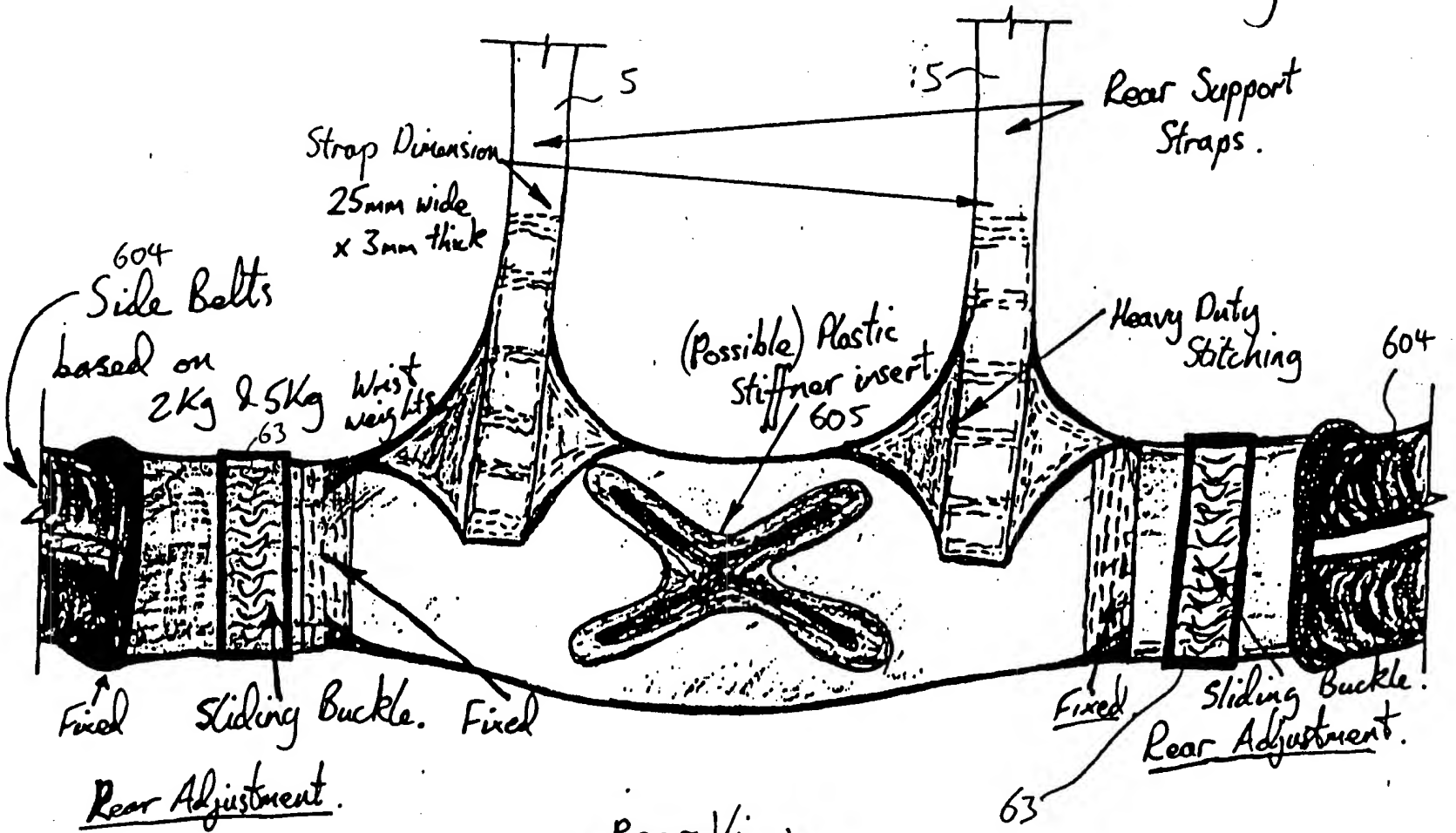
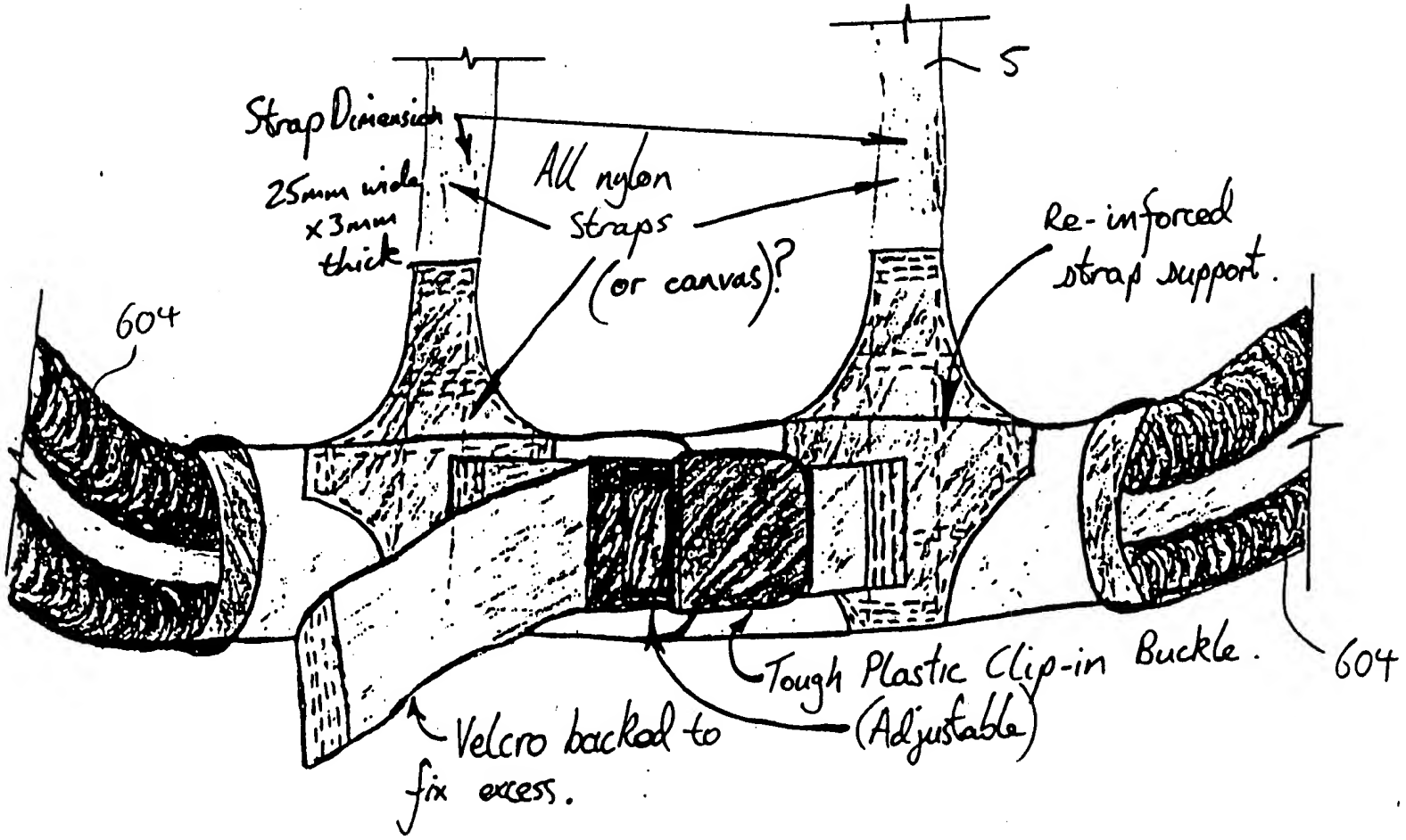

YOKE
2
Plan View.
5
5
22L
22S
201
Shoulder Position (Approx)
FRONT
BACK
211
Shoulder Position. (Approx).
21
201
Yoke
Rear Adjustment
Fixed
99
Buckle
Sliding Buckle
5
99
34mm x 20mm (Approx)
5

Fig 17



Rear View.

Fig 18



FRONT VIEW.